In the Claims

Claims 1 - 11 (Cancelled)

12. (New) A method for detecting chemical species present in a condensed medium comprising:

determining characteristic wavelengths and intensity values of back-scattered electromagnetic emission signals due to fluorescence of chemical species excited in response to a multiplicity of electromagnetic excitations of distinct wavelengths of at least one chemical species that could be contained in said condensed medium;

successively exciting a multiplicity of surface elements of a surface portion of said condensed medium with a laser beam having tunable wavelength capable of taking on at least one of value of said distinct wavelengths of said multiplicity of electromagnetic excitations;

successively recording wavelengths and intensity values of the electromagnetic emission signals back-scattered by each of said surface elements in response to the electromagnetic excitations produced by said beam;

comparing at least one excitation wavelength and at least one corresponding emission wavelength of the recorded intensity value of said electromagnetic signal back-scattered by each of said surface elements with said determined characteristic intensity value of said back-scattered electromagnetic signal of said chemical species that could be contained in said surface portion; and

determining the presence of said chemical species in each of said surface elements when said recorded intensity value of said electromagnetic signal back-scattered by said surface element is greater than a threshold defined at least by said determined characteristic intensity value of said back-scattered electromagnetic signal of said chemical species.

13. (New) The method according to claim 12, further comprising exciting the surface element of the condensed medium with a laser beam and varying the excitation frequency for a given chemical species in a manner to enable detection of the presence of said chemical species on a portion of the surface of the condensed medium, the laser beam stemming from a laser generator being concentrated on a surface element on a surface portion.

14. (New) The method according to claim 12, wherein successively recording comprises observing the direction of said laser beam for each surface element of said surface portion to reference coordinates of origin of said back-scattered electromagnetic emission signals by which the position of said chemical species in said surface portion is obtained.

15. (New) The method according to claim 12, further comprising determining the concentration of said chemical species present in said medium by measuring the amount of energy emitted by said back-scattered electromagnetic emission signals.

16. (New) The method according to claim 12, further comprising recording in parallel intensity values of said back-scattered electromagnetic emission signals and recording their corresponding wavelength.

17. (New) The method according to claim 12, further comprising:

determining characteristic intensity values of the back-scattered electromagnetic emission signals in response to an excitation after a given interval of time and during a given period of time of at least one chemical species that could be contained in said condensed medium;

recording intensity values of the back-scattered electromagnetic emission signals in response to an excitation of said condensed medium after said given interval of time and during said given period of time; and

comparing said recorded intensity values and said determined intensity values to determine the presence of said chemical species in said condensed medium.

18. Apparatus for detecting chemical species present in a condensed medium comprising:

means for determining characteristic wavelengths and intensity values of back-scattered electromagnetic emission signals in response to a multiplicity of electromagnetic excitations of distinct wavelengths of at least one chemical species that could be contained in said condensed medium;

a laser generator producing a laser beam to successively excite a multiplicity of surface elements of a surface portion of said condensed medium according to wavelengths capable of taking on at least the values of said distinct wavelengths of said multiplicity of electromagnetic excitations;

means for successively recording the wavelengths and intensity values of electromagnetic emission signals back-scattered by each of said surface elements in response to the electromagnetic excitations produced by said beam;

comparison and determination means, for comparing at least one excitation wavelength and at least one corresponding emission wavelength the recorded intensity value of said electromagnetic signal back-scattered by each of said surface elements to said determined characteristic intensity value of said back-scattered electromagnetic signal of said chemical species that could be contained in said condensed medium and for determining the presence of said chemical species in each of said surface elements when said recorded intensity value of said electromagnetic signal back-scattered by said surface elements is greater than a threshold defined at least by said determined characteristic intensity value of said back-scattered electromagnetic signal of said chemical species; and

a computer connected to the recording means which has a memory capable of storing simultaneously the wavelength of the back-scattered signals and its intensity for sequential archiving, surface element by surface element, indexed by the displacement means and stored in the memory of the computer the measurements of intensity and wavelengths of the back-scattered signals.

19. (New) The apparatus according to claim 18, wherein the laser generator comprises:

a pump laser associated with a frequency doubler; and

a parametric oscillator to which said pump laser is coupled to emit radiation and having a tunable wavelength between 200 and 800 nm.

20. (New) The apparatus according to claim 18, wherein the laser generator comprises a pumping source operating in femtosecond mode.

21. (New) The apparatus according to claim 18, wherein said laser generator comprises means for orientation of said beam for exciting said multiplicity of said surface elements of said surface portion of said condensed medium to analyze the back-scattered electromagnetic emission signals originating from each of said surface elements and of determining the presence of at least one of said chemical species in each of said surface elements of said surface portion.

22. (New) The apparatus according to claim 21, further comprising means for successively recording the direction of said laser beam for each surface element of said surface portion to reference the coordinates of the origin of said back-scattered electromagnetic emission signals such that one obtains the position of said chemical species in said surface portion.

23. (New) The apparatus according to claim 18, wherein the recording means comprises a spectrometer coupled to a matrix of photodetectors to record in parallel the intensity values of said back-scattered electromagnetic emission signals and to record their corresponding wavelengths.